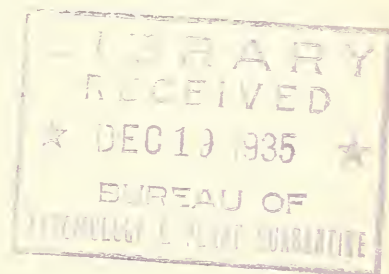


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THE INSECT PEST SURVEY  
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## REPORT ON STATUS OF THE EUROPEAN CORN BORER IN 1935

By A. M. Vance, Associate Entomologist  
Division of Cereal and Forage Insect Investigations  
Bureau of Entomology and Plant Quarantine  
U. S. Department of Agriculture

A survey to determine the status of the European corn borer, as regards degree of infestation, in 1935, over much of the infested territory, was conducted by the Bureau of Entomology and Plant Quarantine from August 16 to September 15 in the one-generation area, and from September 3 to 30 in the two-generation area. It was directed from the laboratory for European corn borer research at Toledo, Ohio, W. A. Baker in charge. This work was carried out essentially as planned and resulted in the examination of 1,900 cornfields, taken at random on a county or county-group basis, within 135 counties in Michigan, Indiana, Ohio, Pennsylvania, New York, Vermont, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, and Virginia. Sixteen experienced men, working singly, were engaged in the field work and traveled a total of 37,760 miles during the survey.

The Conservation Department of Indiana and the State Department of Agriculture in Maine cooperated actively in the surveys in their respective States.

Field methods, previously proved satisfactory for supplying corn-borer abundance data adequate for comparisons between counties and county groups for one or more years, were employed. Generally, the counties situated in the older infested portion of the area were considered separately, and in each a total of 20 random fields were surveyed. In the more lightly infested sections the counties were combined in groups of 2 to 5, and in each group a total of 30 or 40 random fields were surveyed. The percentage of plant infestation was determined by a count of 100 plants in each field, and the average number of borers per infested plant was found by a dissection of 10 infested plants in each field of a county unit, and of 5 infested plants in each field of a county group.

The accompanying tables and maps show the status of the European corn borer in 1935 in comparison with its abundance in recent years.

In the one-generation area a very definite increase in corn-borer infestation occurred in 1935, over that of 1934, in southeastern Michigan, northeastern Indiana, and the northwestern quarter of Ohio, in decided contrast to the rather general decrease found in the same sections in 1934, as compared with 1933.

The territory in Michigan, Indiana, and Ohio which showed an increase in 1935 over 1934 comprised 50 (or 67.6 percent) of the 74 counties surveyed in that part of the one-generation area. In 19 of the other counties included, the survey revealed no change in the corn-borer population from that of last year, and in one group of 5 counties in northeastern Ohio there was a decrease in infestation. In the same territory in 1934 only 1 county, the data on which were comparable with those of 1933, showed an increase over the previous year, while all other counties or county groups surveyed either exhibited no appreciable change or showed a significant decrease.

In Michigan, one of the most outstanding increases of the corn borer in 1935 occurred in the northern part of the "thumb", in the Genesee-Huron-Sanilac-Tuscola County group, where the average number of borers per 100 plants showed a nine-fold increase from 15.6 in 1934 to 142.7 in 1935. Of the 40 fields surveyed in this section, 23 (or 57.5 percent) had average populations of over 100 borers per 100 plants; 10 (or 25 percent) had over 200 borers per 100 plants; 3 (or 7.5 percent) had over 300 borers per 100 plants; and one field had a maximum of 413 borers per 100 plants.

The most significant increase in Indiana was found in the Allen-DeKalb-Steuben County group, in the extreme northeastern corner of the State, where the average number of borers per 100 plants in 1935 was 27.8, or  $3\frac{1}{2}$  times as great as the average of 7.7 recorded in the same region in 1934. Infestation was apparent in the counts made in all 40 fields of this group, and a maximum of 142.8 borers per 100 plants was found in one field.

A considerable rise in infestation was apparent in the northwestern quarter of Ohio, where half of the counties surveyed fell within a zone of increase. As in previous years, the most heavily infested section in 1935 seemed to follow the old lake bottom land extending in a southwesterly direction from the western end of Lake Erie. The highest infestations were found in Lucas and Wood Counties, which had averages of 121.5 and 91.2 borers per 100 plants, respectively. In Paulding, Putnam, and Sandusky Counties the borer populations were 12 times as great as those found in 1934, and in several of the more southern county groups the comparatively low infestation of 1934 had grown appreciably. Relatively light infestation continued in the eastern part of the surveyed area in Ohio.

The infestation in 1935 tended to remain about the same as in 1934 in a group of 3 counties in northwestern Pennsylvania, and in 8 counties of western New York, with significant decreases appearing in 5 counties immediately south of Lake Ontario. In the Albany, N. Y., section there was an increase this year over last.



Centre County in Pennsylvania was included in the survey in 1935 for the first time. An average of 22.5 borers per 100 plants was observed for the county, with most of the infestation occurring in its eastern and southeastern parts where average populations of 231 and 277 borers per 100 plants were found in two of the fields surveyed.

In Vermont, the figures on infestation in 1935 are not directly comparable with those obtained in 1934 because of a variation in the portion of the State included in the survey. The data for 1935 showed an average of 32.3 borers per 100 plants for the western part of Vermont. The heaviest concentrations of the insect were found in the extreme northern portion of the surveyed area where 4 fields contained average populations of between 100 and 350 borers per 100 plants.

Seasonal conditions in 1935 were apparently very favorable to corn-borer development in the western portion of the one-generation area and were undoubtedly responsible for the general building up of infestation from the low levels of 1934. An increase, such as found this year, emphasizes the potential of the European corn borer under favorable conditions. The decrease or lack of change of the infestation evident in northwestern Pennsylvania and western New York, in 1935, is not now explicable. Corn debris was scarce in western New York last spring, and possibly there occurred a considerable reduction of overwintering borers as a result of a greater utilization of crop material for livestock feed following the droughty conditions of 1934.

In the two-generation area, the 1935 survey revealed no significant changes in infestation from 1934 in Massachusetts and Rhode Island, or in New Haven County, Connecticut, although a trend toward increase was apparent in the eastern tier of counties in Massachusetts.

Significant increases in infestation were found in the Strafford-Rockingham County group, New Hampshire; in Hartford and Middlesex Counties, Connecticut; in Suffolk County, New York; and in Monmouth County and the Atlantic-Burlington-Ocean County group, New Jersey. A decrease appeared in New London County, Connecticut.

Southeastern New England and eastern Long Island continued to be the center of heaviest borer concentrations. Extremely high populations of the insect were found in 1935 in Hartford, New Haven, and Middlesex Counties, Connecticut, and in Suffolk County, New York, where the average numbers of borers per 100 plants per respective county were as follows: 721.4, 469.2, 415.8, and 595. In 23 (or 38.3 percent) of the 60 fields surveyed in the above-named three Connecticut counties the average was more than 500 borers per 100 plants, and in 9 (or 15 percent) of the fields the average exceeded 1,000 borers per 100 plants, including a maximum of 2,340 borers per 100 plants in one field in New Haven County. In 9 (or 45 percent) of the 20 fields surveyed in Suffolk County, New York, the average number of borers per 100 plants was over 500, and in 4 (or 20 percent) of the fields it exceeded 1,000 per 100 plants.

The continued increase in corn-borer populations in New Jersey, and the extent of infestation found on the "Eastern Shore" of Maryland and Virginia, where a survey was made this year for the first time, are of particular interest because of the possible reactions of the insect in its spread southward to new environments.

In New Jersey, 46 fields (or 76.6 percent) of the 60 fields surveyed in 1935 showed infestation by the borer as compared with 18 (or 45 percent) of the 40 fields examined in the same counties in 1934. The heaviest infestations continued to be in Monmouth and Ocean Counties, where 6 of the fields this year contained populations of over 100 borers per 100 plants, with a maximum of 326 per 100 plants in one field.

Most of the infestation in the Wicomico-Worcester County group, Maryland, was confined to Worcester County. Eleven (or 36.7 percent) of the 30 fields surveyed in the two counties were found infested with the European corn borer. The average numbers of borers per 100 plants in the four highest fields were as follows: 87, 67.2, 55.1, and 42.1.

The infestation in the Accomac-Northampton County group, Virginia, occurred largely in the upper two-thirds of the section. Twenty-five (or 83.3 percent) of the 30 fields surveyed were infested by the European corn borer. The average numbers of borers per 100 plants in the four highest fields were as follows: 68, 66.1, 43.2, and 42.9.



Table 1. Data on infestation of the European corn borer in the fall of 1935 and comparisons with figures for 1932, 1933, and 1934

One-Generation Area

Michigan

<u>County or County Group</u>	<u>Average number of borers per 100 plants</u>			
	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>
Lenawee	50.0	32.0	13.3	56.4
Macomb	72.6	16.4	20.9	45.9
Monroe	72.7	62.8	27.6	42.9
St. Clair	20.8	15.7	11.8	57.3
Washtenaw	49.7	16.4	2.7	19.5
Wayne	59.7	35.8	7.7	7.2
Lapeer-Livingston-Oakland	24.8	14.0	3.7	23.5
Genesee-Huron-Sanilac-Tuscola	40.2	--	15.6	142.7
Hillsdale-Ingham-Jackson	13.3	--	1.2	16.1
Regional averages				
Based on first 7 counties and county groups	50.0	27.6	12.5	36.1
Based on all counties and county groups	44.9	-	11.6	45.7

Ohio

Defiance	12.8	12.6	8.1	4.8
Fulton	46.2	53.7	30.1	41.0
Hancock	53.8	36.5	25.9	38.8
Henry	52.7	58.8	10.4	44.7
Lucas	49.8	181.2	22.7	121.5
Ottawa	49.7	70.7	22.5	25.9
Paulding	30.5	6.5	3.0	42.1
Putnam	48.0	15.0	3.1	37.6
Sandusky	66.3	71.7	3.8	48.6
Seneca	46.6	6.5	16.7	27.9
Williams	27.1	34.1	2.5	9.2
Wood	66.5	92.5	47.6	91.2
Allen-Auglaize-Mercer-Van Wert	19.5	7.1	8.4	29.2
Crawford-Wyandot	13.2	14.0	1.5	13.7
Erie-Huron-Lorain	20.0	13.6	10.2	9.3
Ashland-Knox-Morrow-Richland	4.1	-	2.7	3.8
Delaware-Hardin-Marion-Union	17.4	-	7.1	36.3
Champaign-Darke-Logan-Miami-Shelby	7.0	-	5.0	12.9
Clark-Fayette-Greene-Madison-Montgomery	0.8	-	0.3	0.5
Medina-Portage-Stark-Summit-Wayne	2.8	-	5.7	2.4

Regional averages

Based on first 15 counties and county groups	40.2	45.0	14.4	39.0
Based on all counties and county groups	31.7	-	11.9	32.1

## Indiana

County or County Group	Average number of borers per 100 plants			
	1932	1933	1934	1935
Allen-DeKalb-Steuben	6.6	11.8	7.7	27.8
Adams-Blackford-Jay-Wells	0.6	-	0.3	2.3
Delaware-Henry-Randolph-Wayne	0.2	-	0	1.2
Huntington-Noble-Whitley	1.3	-	2.6	5.9
Regional average				
Based on all county groups	2.2	-	2.7	9.3

## New York

Chautauqua	31.5	29.7	8.6	15.7
Erie	36.9	19.9	7.7	21.6
Genesee	28.7	34.8	14.3	3.2
Jefferson	157.7	41.3	50.8	48.8
Monroe	66.8	23.4	60.1	26.5
Niagara	51.9	19.2	25.3	5.9
Orleans	65.8	55.6	90.5	8.2
Oswego	159.4	31.3	32.0	40.9
Wayne	74.4	23.6	44.9	17.5
Cattaraugus	19.5	-	0.8	2.1
Livingston-Ontario-Wyoming	35.1	-	2.7	3.5
Albany-Fulton-Montgomery-Schenectady-Schoharie	71.4	-	25.4	48.1
Regional averages				
Based on first 9 counties	74.8	31.0	37.1	20.9
Based on all counties and county groups	66.6	-	30.3	20.2

## Pennsylvania

Centre	-	-	-	22.5
Erie-Crawford-Warren	-	-	2.2	1.0

## Vermont

Bennington-Rutland-Windham-Windsor	15.8	-	23.2	-
Addison-Bennington-Rutland	-	-	-	27.4
Chittenden-Grand Isle-Washington	-	-	-	37.2
Regional average	-	-	-	32.3

Two-Generation Area

Maine

<u>County or County Group</u>	<u>Average number of borers per 100 plants</u>			
	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>
York	30.6	-	-	10.4
Oxford	-	-	-	2.5
Regional average	-	-	-	6.5

Massachusetts

Bristol	206.8	469.4	107.2	86.1
Essex	211.8	104.2	105.8	200.5
Middlesex	153.0	214.2	185.9	303.9
Barnstable-Norfolk-Plymouth	181.6	-	153.5	259.8
Franklin-Hampden-Hampshire-Worcester	13.0	-	40.1	20.5
Regional averages				
Based on first 3 counties	190.5	262.6	133.0	196.8
Based on all counties and county groups	153.2	-	118.5	174.2

Rhode Island

Bristol-Newport	190.0	326.3	172.3	150.1
Kent-Providence-Washington	43.8	-	61.7	71.5
Regional average	116.9	-	117.0	110.8

Connecticut

Hartford	50.7	387.4	61.3	721.4
Middlesex	31.5	153.6	318.2	415.8
New Haven	2.4	107.9	325.0	469.2
New London	76.7	49.7	135.8	44.7
Tolland-Windham	-	-	-	35.0
Regional average				
Based on first 4 counties	40.3	174.7	210.1	412.8

New Hampshire

Rockingham-Strafford	19.6	-	8.7	72.6
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New York  
(Eastern Long Island)

Suffolk	394.4	356.5	279.6	595.0
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New Jersey

<u>County or County Group</u>	<u>Average number of borers per 100 plants</u>			
	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>
Monmouth	0.9	-	20.4	43.4
Atlantic-Burlington-Ocean	0.1	-	3.4	33.3
Regional average	0.5	-	11.9	38.4

Maryland

Wicomico-Worcester	-	-	-	9.4
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Virginia

Accomac-Northampton	-	-	-	18.1
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Table 2. Summary of infestation of the European corn borer by States and areas  
1932 - 1935

<u>One-Generation Area</u>	<u>Average number of borers per 100 plants*</u>			
	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>
Michigan	50.0	27.6	12.5	36.1
Indiana	6.6	11.8	7.7	27.8
Ohio	40.2	45.0	14.4	39.0
New York	74.8	31.0	37.1	20.9
Pennsylvania	-	-	2.2	1.0
Vermont	-	-	-	32.3
Area average (based on first 4 States)	42.9	28.9	17.9	31.0
<u>Two-Generation Area</u>				
Massachusetts	190.5	262.6	133.0	283.4
Rhode Island	190.0	326.3	172.3	150.1
Connecticut	40.3	174.7	210.1	412.8
New Hampshire	19.6	-	8.7	72.6
New York (Suffolk County)	394.4	356.5	279.6	595.0
New Jersey	0.5	-	11.9	38.4
Maryland	-	-	-	9.4
Virginia	-	-	-	18.1
Area average (based on first 3 States and Suffolk County, N. Y.)	203.8	280.0	198.8	360.3

\* All averages based only on comparable counties or county groups.



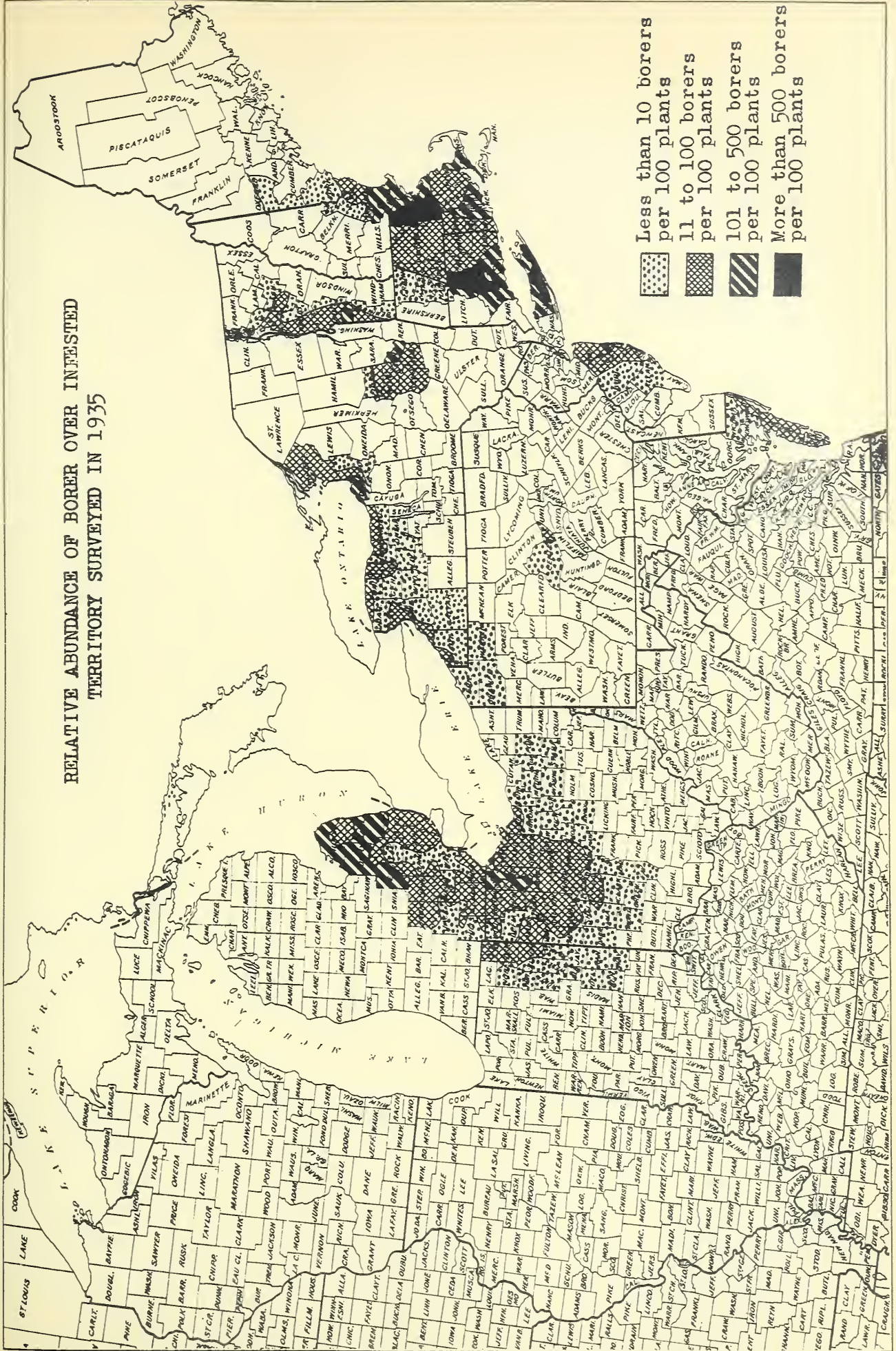
Table 3. Grouping of cornfields surveyed in 1934 and 1935 according to their borer populations

		Percent of surveyed fields in--*			
Average number of borers:		One-generation area :		Two-generation area	
per 100 plants	:	1934	1935	1934	1935
	:	:	:	:	:
0	:	28.8	21.6	16.1	15.6
1-25	:	55.9	51.4	26.7	31.1
26-50	:	8.9	10.9	11.4	12.3
51-100	:	4.8	9.4	11.9	12.1
101-200	:	1.2	4.8	12.2	9.8
201-300	:	0.3	1.2	7.8	4.0
301-400	:	-	0.4	5.8	3.6
401-500	:	0.1	0.1	5.0	2.3
501-600	:	-	0.1	1.1	1.2
601-700	:	-	-	1.1	1.3
701-800	:	-	-	0.3	1.0
801-900	:	-	0.1	0.1	1.2
901-1000	:	-	-	-	1.2
1001-2000	:	-	-	-	2.9
2001-2350	:	-	-	-	0.4
	:	:	:	:	:

\* The percentages for the one-generation area are based on a total of 1,240 surveyed fields in 1934 and 1,380 in 1935; those for the two-generation area are based on a total of 340 surveyed fields in 1934 and 520 in 1935.



# RELATIVE ABUNDANCE OF BORER OVER INTERESTED TERRITORY SURVEYED IN 1935





115  
1272  
1273  
1274





**STATUS OF EUROPEAN CORN BORER  
IN 1935 AS COMPARED WITH 1934**

**Legend:**

- Increase** (Solid black)
- Unchanged** (Diagonal lines)
- Decrease** (Cross-hatch)
- No comparison** (Dotted)



